

DD-26009

Title: SOCK

## **RELATED APPLICATION**

[0001] This application is a national application corresponding to International Application No. PCT/DE2004/002140 filed September 24, 2004.

## **BACKGROUND OF THE INVENTION**

### **A. Field of the Invention**

[0002] This invention relates to a sock having padding in some areas, in particular for use in athletic activities.

### **B. Description of the Related Art**

[0003] The anatomy of the human foot naturally offers fat pads on the sole of the foot which have a shock-absorbing effect in running or walking. The other areas of the foot, e.g., the ankle or the instep, do not have such fat pads. This natural design of the foot is designed for walking or running without shoes, i.e., barefoot, because all that is necessary then is a distribution of the pressure on the sole of the foot.

[0004] However, human feet are often accommodated in sturdy shoes. This is the case in particular when the person is moving rapidly and extensively, e.g., during athletic activities. The shoes then serve to cushion impacts and to secure the foot well while on the other hand preventing injuries to the sole of the foot from striking sharply pointed roughness in the surface or objects on the ground.

[0005] When feet are accommodated in sturdy shoes, pressure points occur on the feet. These pressure points result from the constricting effect of the shoe, the tongue, impact with the heel, etc. Depending on their design, shoes develop different pressure

zones. Since these pressure zones do not occur on the sole of the foot, no natural cushioning is provided there in the form of fat pads.

[0006] To reduce the pressure load on the foot, it is known that padding may be provided in socks. These pads should make it possible to reduce the pressure load. For example, a sock with a reinforced tread surface is known from WO 97/09890 A, for example; with this sock, the reinforcement has a contour corresponding essentially to that of the tread surface. Therefore, the sock offers additional damping. However, since the foot is naturally provided with fat cushions in the area of the tread surface, there is theoretically no need for such cushioning in the tread area. In addition, it is known (see DE 297 15 762 U1) that padding may be provided in other areas of socks, i.e., in the instep, for example, or padding may be provided in the area of the shins and/or calves for the case when shoes are worn that go beyond the ankle, e.g., for hiking, skiing, inline skating or the like. This padding should also result in a reduction in load.

[0007] To further reduce the pressure load when wearing shoes, padding is provided in the shoes, especially on modern athletic shoes. For example, the shoe tongue may be padded with soft material. The same thing is also true of the edge in the area of the heel, which is usually hard. In addition, in the case of calf-high shoes, additional cushioning is often provided in the area of the ankle to reduce the pressure load there.

[0008] In the combination of the aforementioned modern athletic shoe with the

known socks having padding for pressure relief, the following problem occurs: both the shoes and the socks are padded in the areas of the greatest load, i.e., especially in the area of the instep, the ankle, the Achilles tendon and the like. Since both the shoes and the socks have additional padding in the same areas of the foot, this results in double padding in these areas. However, this does not usually provide any relief for the feet. Instead this double padding causes an additional pressure load on the feet, which leads to a reduction in wearing comfort and therefore results in more rapid fatigue. This then counteracts the actual goals of padding of socks and/or shoes, namely, to provide relief.

### **C. Summary of the Invention**

[0009] The present invention wants to remedy this situation. The object of the present invention is to create a sock with areas of padding while avoiding double padding. According to this invention, this object is achieved by coordinating the arrangement of pads in the sock with the arrangement of pads in the shoe.

[0010] This invention creates a sock having padding in some areas in such a way as to prevent double padding. Consequently, there is no additional load and instead the padded area is expanded, resulting in a uniform pressure distribution. This prevents premature fatigue.

[0011] In another embodiment of the present invention, the pads in the area of the instep are formed by absorption pads with a web provided between them. The absorption pads preferably protrude beyond the web. This ensures that the tongue provided on the respective shoe is arranged between the absorption pads when the shoe is being worn.

Since the tongue is not padded, double padding is prevented due to the lateral arrangement of the absorption pads. Instead, the result is a continuous surface which results in a uniform pressure distribution. This in turn counteracts pressure points as well as premature fatigue of the foot.

[0012] In another embodiment of the present invention, the pads in the area of the heel are formed by spacer pads with a web being provided between them. The spacer pads advantageously protrude above the web. This creates the possibility of positioning the padding of the edge, which is provided in the area of the heel of the shoe, above a protective cap which is usually provided in the area of the web, i.e., in an area that has little or no padding. This avoids double padding. The side-by-side arrangement of the spacer pads leads to a uniform cushioning effect in the area of the heel and thus to a uniform pressure distribution.

[0013] In the embodiment of the invention, the sock has an air channel. The air channel makes it possible for moisture to evaporate and/or for the part of the moisture that does not evaporate to be absorbed by the fabric. In addition, the air channel creates the possibility of removing moisture from the area of the shoe out of the area of the shoe.

[0014] The sock is advantageously furnished with an X-Cross bandage. The X-Cross bandage supports the ankle in the transitional area between the leg and foot. Other embodiments and refinements of the present invention are characterized in the other subclaims.

#### **D. Brief Description of the Drawing**

[0015] One exemplary embodiment of the present invention is depicted in the drawing and described in greater detail below. The drawings show:

Figure 1 is a diagram of a sock in a side view;

Figure 2 is a perspective diagram of a sock in another embodiment;

Figure 3 is a simplified diagram of a shoe in a side view;

Figure 4 is the sock shown in Figure 1 in combination with the shoe shown in Figure 3, and

Figure 5 is a section along line V-V in Figure 4 on an enlarged scale.

#### **E. Detailed Description of the Invention**

[0016] Sock 1 has a toe area 11, a heel area 12 and a tread area 13 situated between the toe area and the heel area. These areas 11, 12 and 13 may be made of a reinforced material, as depicted in the exemplary embodiment. Use of blended materials such as wool with elastomer fiber materials, e.g., elastan is also possible.

[0017] The foot part of the sock is connected to a shaft which ends above the ankle in the exemplary embodiment according to Figure 3, but extends over the calf in the exemplary embodiments according to Figures 1 and 2. On the end at a distance from the foot part, the shaft is provided with a collar 14. In the exemplary embodiment shown here, an air channel 15 extends from the collar 14 as far as the tread area 13 and is made of a

climate regulating knit mesh fabric. The air channel 15 contributes toward moisture being removed from the sole area upward. Such an air channel may be provided on the sock on the inside of the leg or on the outside of the leg or on both.

[0018] The sock 1 may also be furnished with an X-Cross bandage (not shown) formed from an elastic climate regulating woven fabric. The X-Cross bandage supports the ankle in the transitional area between the leg and the foot.

[0019] The sock 1 is provided with pads 2 in some areas. In the exemplary embodiment according to Figure 1, an absorption pad 21 is provided, extending from the toe area over the instep of the foot part to the lower area of the shaft of the sock. The pad 21 is arranged at the side of the instep. On the invisible side of the sock 1 shown in Figure 1, a compatible absorption pad 22 is provided (visible in Figure 5). The pad 22 has essentially the same shape as the pad 21 shown in Figure 1. A web 23 is provided between the pads 21 and 22, also extending from the toe area 11 to the lower area of the shaft of the sock. The pads 21, 22 protrude definitely beyond the web 23.

[0020] In the area of ankle, i.e., in the transition between the foot part and the shaft of the sock, a pad 24 is provided, having an essentially ring-shaped design. The ring-shaped pad 24 encloses an essentially circular area 25. The pad 24 is designed so that it definitely protrudes above the area 25.

[0021] In the exemplary embodiment according to Figure 2, two spacer pads 26,

27 are arranged on the sock 1 in the area of the heel. In the exemplary embodiment, the shape of the spacer pads 26, 27 is adapted to the anatomy of the foot in this area. The spacer pad 26 begins in the heel area 12 and ends at a web 28 which is provided between the spacer pads 26, 27. The web 28 may be made of a climate regulating fabric. The spacer pads 26, 27 are designed so that they definitely protrude beyond the web 28.

[0022] The pads 2 are generally made of synthetic yarns or compound fabrics or Yarns or similar materials. In the exemplary embodiment, the pads 2 of the sock 1 are made of hollow chamber fibers covered with wool or cotton in spinning. The hollow chamber synthetic yarns have an especially high impact-absorbing and pressure-absorbing effect. The tread area 13 may be made of microfiber knit which helps to reduce abrasion. The foot bed is also made of microfibers in the toe and heel areas 11, 12.

[0023] The shoe, labeled as 3 in general in the exemplary embodiment, has pads 4 in some areas. It has a sole 31. A closed upper part 32 is provided on the sole 31. When the sock is worn (Figure 4) the wearer's foot is supported on the sole 31 while the rest of the foot up to the ankle is surrounded by the upper part 32. The upper part 32 may be made of different materials. In the past, mainly leather has been used as the material for the shoe upper part 32, but today mainly artificial fibers and synthetics are used.

[0024] The upper part 32 of the shoe 3 has a tongue 33 by means of which the shoe is tied (not shown here). To this end, eyelets 34 are provided in the shoe. The

tongue 33 is provided with a pad 4 in the form of cotton padding 41 to prevent pain to the wearer's foot when tying the shoe and/or under a heavy load. A cap 35 is provided in the front area of the shoe 3. The cap 35 may be made of a hard plastic, leather or a tight knit fabric. In addition, a protective cap is also provided in the heel area of the shoe, where it is labeled as 36. The protective cap 36 may be made of solid plastic, leather or reinforced knit synthetic fibers. The cap 36 extends into the lateral areas of the shoe to provide lateral guidance for the heel.

[0025] In the area between the protective caps 35 and 36, the top part 32 of the shoe is made of leather or synthetic fibers. The areas made of this material are labeled as 37. These areas contribute significantly to the structural strength of the top part of the shoe. In the area 37 of the top 32 of the shoe there are climate zones 38 which are provided in various locations and in various forms and sizes depending on the area of application of the shoe. The areas 37 are provided with pads 42 on the inside to increase wearing comfort. Above the protective cap 36 the shoe 3 is equipped with a padding 43 to reduce the load on the heel.

[0026] The arrangement of the pads 2 on the sock 1 is coordinated with the arrangement of the pads 4 on the shoe 3. As an example, this is explained below on the basis of the absorption pads 21, 22 with the web 23 in between them on the one hand and the cotton padding 41 in the tongue 33 of the shoe 3 (Figure 5). The cotton padding 41 on the tongue 33 extends over the entire width of the tongue. It thus also extends beneath the area 37 and consequently also cushions the eyelets 34. The cross-sectional



view according to Figure 5 shows that the cotton padding 41 increases the thickness of the tongue 33. To create optimum cushioning, absorption pads 21, 22 are arranged precisely adjacent to the padded tongue 33. The tongue 33 with the cotton padding 41 is situated exactly on the web 23. The pads 21, 22 and the cotton padding 41 consequently form a continuous uniformly padded surface. This therefore avoids double padding. There is therefore a uniform pressure distribution even under extreme loads or when the shoes are tied very tightly, which counteracts the occurrence of pressure points and thus the risk of premature fatigue.

[0027] The spacer pads 26, 27 in combination with the web 28 have an effect comparable to the effect of the absorption pads 21, 22 and the web 23. As shown by the diagram according to Figure 4, the pad 43 is in contact with the sock 1 above the protective cap 36 of the shoe 3 when the shoes and socks are being worn, thereby relieving the pressure. The spacer pads 26, 27 are arranged exactly adjacent to the pad 43, which is exactly in the area of the web 28. This design also avoids double padding and at the same time there is a uniform load distribution. Furthermore the heel is protected from damage in the area of the heel due to the inventive design even in the case of extreme movements of the foot.

[0028] Although socks have been mentioned in the present description and claims, the present invention is not limited to these embodiments and instead stockings, pantyhose and the like are also to be subsumed under this heading and the present invention also covers them. Furthermore, the invention is not limited only to the shape

arrangement of the pads. Instead, other arrangements and embodiments of pads are also included in the inventive idea, depending on the respective load conditions and/or shoe forms.